REMARKS

The Office Action dated March 13, 2006, has been received and carefully noted. The following remarks are submitted as a full and complete response thereto.

Claims 1-33 are currently pending in the application, of which claims 1-3, 16-18, and 31-33 are independent claims. Claims 1-33 are respectfully submitted for consideration.

Claims 10 and 25 were again rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the invention. The previous Office Action mailed September 21, 2005, had stated that these claims were indefinite because the specification does not disclose or explain "a separate secondary common pilot (SCPICH) according to the WCDMA system is transmitted to each user-specific beam," and the present Office Action did not further explain this rejection.

Applicant respectfully submits that the claims are definite as they are written. There is also sufficient disclosure and support found in the original claims, which are deemed to be part of the specification, as well as paragraph 0050, which states in part that "a radio channel of each user is separated from other radio channels by user-specific codes in accordance with code division multiple access CDMA." Paragraph 0050 also states that a cell has "its own primary common pilot which is multiplied by a scrambling code in order to be transmitted to a channel."

Based on the disclosure of the specification, as evidenced for example in paragraph 0050 and original claims 10 and 25, one of ordinary skill in the art would understand the metes and bounds of the claims. Accordingly, Applicant respectfully submits that claims 10 and 25 are definite.

MPEP 707.07(f) sets forth the Examiner's obligation to answer all material traversed. Specifically MPEP 707.07(f) states that "the examiner should, if he or she repeats the rejection, take note of the applicant's argument and answer the substance of it." It is essential that the Office Action address each of the arguments presented by Applicant, so that meaningful appellate review is possible. The Office Action, however, does not address Applicant's arguments. Accordingly, if the rejection is again maintained, a response to the arguments is respectfully requested in a new Non-Final Office Action.

Specifically, the Office Action did not respond to the arguments presented in the response filed November 29, 2005, except to say that "claims 10 and 25 are still not supported by the specification and are indefinite and are still rejected." Applicant respectfully submits that this does not amount to a rational basis for rejecting the claims. The Office Action did not provide any reasoning suggesting that the claim scope has any uncertainty. Additionally, the Office Action's rejection of claims 10 and 25, which stated, at page 10, lines 11-15, that the recited features are "particular requirements of the particular system of WCDMA" undermines the Office Action's position. Accordingly, Applicant respectfully requests that this rejection be withdrawn.

Claims 1-11, 14-26, and 29-33 were rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,005,516 of Reudink et al. ("Reudink") in view of U.S. Patent No. 5,933,466 of Oshima et al. ("Oshima"). The Office Action took the position that Reudink teaches all the elements of the claims, except "selecting weight factors of antenna elements of the antenna array such that the antenna element specific sums of weight factors of a radio cell formed with the antenna array and corresponding weight factors of at least one, second radio cell formed with the same antenna array are least substantially equal within predetermined limits in order to achieve a predetermined power balance between different antenna elements." The Office Action stated that Oshima remedies the deficiencies of Reudink. Applicant respectfully traverses this rejection.

Claim 1, upon which claims 4-9 and 11-15 depend, is directed to a method for determining weight factors of antenna beams. The method includes using at least one directional antenna beam implemented with an antenna array to establish a radio link. The method also includes forming a radio cell with the antenna beam. The method further includes dividing the radio cell into at least two different cells by dividing the antenna beam. The method additionally includes selecting weight factors of antenna elements of the antenna array such that the antenna element specific sums of weight factors of a radio cell formed with the antenna array and corresponding weight factors of at least one, second radio cell formed with the same antenna array are at least

substantially equal within predetermined limits in order to achieve a predetermined power balance between different antenna elements.

Claim 2, upon which claim 14 depends, is directed to a method for determining weight factors of antenna beams including using at least one directional antenna beam implemented with an antenna array to establish a radio link, dividing the antenna beam into at least two user-specific beams, and selecting weight factors of antenna elements of the antenna array such that the antenna element specific sums of weight factors of antenna elements of a user-specific beam and corresponding weight factors of other user-specific beams formed with the same antenna array are at least substantially equal within predetermined limits in order to achieve a predetermined power balance between different antenna elements.

Claim 3, upon which claim 10 depends, is directed to a method for determining weight factors of antenna beams. The method includes using at least one directional antenna beam implemented with an antenna array to establish a radio link, forming a radio cell with the antenna beam, dividing the radio cell into at least two different cells by dividing the antenna beam, dividing at least one antenna beam forming a radio cell into at least two user-specific beams, and selecting weight factors of antenna elements of the antenna array such that the antenna element specific sums of corresponding weight factors of beams formed with the same antenna array are at least substantially equal within predetermined limits in order to achieve a predetermined power balance between different antenna elements.

Claim 16 is directed to a transmitter for determining weight factors of antenna beams, in which transmitter at least one directional antenna beam implemented with an antenna array is used to establish a radio link and a radio cell is formed with the antenna beam. The transmitter includes means for dividing the radio cell into at least two cells by dividing the antenna beam, and means for selecting weight factors of antenna elements of the antenna array such that the antenna element specific sums of weight factors of a radio cell formed with the antenna array and corresponding weight factors of at least one, second radio cell formed with the same antenna array are at least substantially equal within predetermined limits in order to achieve a predetermined power balance between different antenna elements.

Claim 17, upon which claims 19-23 depend, is directed to a transmitter for determining weight factors of antenna beams, in which transmitter at least one directional antenna beam implemented with an antenna array is used to establish a radio link. The transmitter includes means for dividing the antenna beam into at least two user-specific beams, and means for selecting weight factors of antenna elements of the antenna array such that the antenna element specific sums of weight factors of antenna elements of a user-specific beam and corresponding weight factors of other user-specific beams formed with the same antenna array are at least substantially equal within predetermined limits in order to achieve a predetermined power balance between different antenna elements.

Claim 18, upon which claims 24-30 depend, is directed to a transmitter for determining weight factors of antenna beams, in which transmitter at least one directional

antenna beam implemented with an antenna array is used to establish a radio link and a radio cell is formed with the antenna beam. The transmitter includes means for dividing the radio cell into at least two different cells by dividing the antenna beam, means for dividing the antenna beam forming a radio cell into at least two user-specific beams, and means for selecting weight factors of antenna elements of the antenna array such that the antenna element specific sums of corresponding weight factors of beams formed with the same antenna array are at least substantially equal within predetermined limits in order to achieve a predetermined power balance between different antenna elements.

Claim 31 is directed to a transmitter for determining weight factors of antenna beams, in which transmitter at least one directional antenna beam implemented with an antenna array is used to establish a radio link and a radio cell is formed with the antenna beam. The transmitter includes dividing means dividing the radio cell into at least two cells by dividing the antenna beam, and selecting means selecting weight factors of antenna elements of the antenna array such that the antenna element specific sums of weight factors of a radio cell formed with the antenna array and corresponding weight factors of at least one, second radio cell formed with the same antenna array are at least substantially equal within predetermined limits in order to achieve a predetermined power balance between different antenna elements.

Claim 32 is directed to a transmitter for determining weight factors of antenna beams, in which transmitter at least one directional antenna beam implemented with an antenna array is used to establish a radio link. The transmitter includes dividing means

dividing the antenna beam into at least two user-specific beams, and selecting means selecting weight factors of antenna elements of the antenna array such that the antenna element specific sums of weight factors of antenna elements of a user-specific beam and corresponding weight factors of other user-specific beams formed with the same antenna array are at least substantially equal within predetermined limits in order to achieve a predetermined power balance between different antenna elements.

Claim 33 is directed to a transmitter for determining weight factors of antenna beams, in which transmitter at least one directional antenna beam implemented with an antenna array is used to establish a radio link and a radio cell is formed with the antenna beam. The transmitter includes first dividing means dividing the radio cell into at least two different cells by dividing the antenna beam, second dividing means dividing the antenna beam forming a radio cell into at least two user-specific beams, and selecting means selecting weight factors of antenna elements of the antenna array such that the antenna element specific sums of corresponding weight factors of beams formed with the same antenna array are at least substantially equal within predetermined limits in order to achieve a predetermined power balance between different antenna elements.

It is respectfully submitted that the cited art of Reudink and Oshima, whether viewed singly or in combination, fails to disclose or suggest all the elements of any of the presently pending claims.

Reudink is directed to a system for diversity among narrow antenna beams. Reudink generally describes a system in which an antenna array that provides several

antenna beams, which are diverse from each other in terms of polarization. Reudink notes that polarization differences exist between typical mobile phones (which are normally oriented at 45 degrees) and typical vehicle phones (which are normally oriented vertically). Reudink describes a system in which a receiving system uses multiple antennas to direct antenna beams. The antennas are switched on and off by using a matrix switch (as can be seen at column 10, lines 50-60 of Reudink). The matrix switch is also used to couple a plurality of signals to the same receiver (as can be seen at column 11, lines 19-24 of Reudink).

Reudink describes using a RAKE receiver in a combining or summing process. A RAKE receiver includes a plurality of receiving fingers that are each delayed in relation to each other in order to receive different multipath propagated signal components. In Reudink's described system, if a signal is strong and therefore gives more reliable detection results, more weight is assigned to that signal than to a weak one. The weights are set by using a search searcher or a scan receiver. Reudink asserts that the weighting of received signals in the process of combining provides interference reduction and gain improvement. Reudink also asserts that less complicated and more compact CDMA base stations could be built (as can be seen in column 7, lines 7-19 and column 2, lines 20-23 and 48-55).

Thus, Reudink merely presents a method for producing more compact RAKE-receivers, as explained at column 2, line 60 to column 3, line 2 and column 4, lines 11-21.

There is nothing in Reudink about determining weight factors for antenna beams. Reudink simply teaches that signals received from different receiving "fingers" are given more or less importance in combining for reducing interference and improving gain of a RAKE receiver. Thus, there is also nothing in Reudink, about selecting weight factors of antenna elements of the antenna array.

Each of the independent claims recites "selecting weight factors of antenna elements of the antenna array ... in order to achieve a predetermined power balance between different antenna elements." Reudink does not teach at least this feature of each of the claims. The Office Action implicitly acknowledged this deficiency of Reudink in the Office Action at paragraph 2, p. 5. Oshima does not remedy the deficiencies of Reudink.

The Office Action took the position that Oshima discloses weight factors of antenna elements of the antenna array such that the antenna element specific sums of weigh factors of a radio cell formed with the antenna array and corresponding weight factors of at least one, second radio cell formed with the same antenna array are at least substantially equal within predetermined limits in order to achieve a predetermined power balance between different antenna elements. The Office Action pointed to column 7, lines 8-25 and column 5, lines 53-55 of Oshima. Applicant respectfully disagrees.

Oshima is directed to a radio communication apparatus with a combining diversity in which received signals are weighted appropriately to reduce an error in demodulation and to improve communications quality. Oshima generally describes a technique for

improving the communication quality of a radio communication apparatus with a combining diversity by properly weighting received signals, as discussed at column 1, lines 65-66 of Oshima.

Oshima's delay circuits delay the carrier/noise (C/N) ratio detection signals by a predetermined amount in synchronization with a clock generated from the clock generator. The amount of delay is determined so as to erase the difference between the processing delay time required from when the digital intermediate frequency signals are output from the reception circuit until they are supplied to the detecting circuits through the delay correction circuits and demodulated into digitally demodulated based band signals and the processing delay time required from when the C/N ratio detection signals are output from the C/N ratio detection circuits until the weight coefficients are generated. The weight coefficients are standardized such that the total sum of these coefficients always has a predetermined (constant) value (as can be seen at column 4, lines 25-50 and column 5, lines 65-67).

In other words, as explained by the Abstract of Oshima, digital demodulation signals are input to multiplication circuits. The multiplication circuits multiply the digital demodulation signals by weight coefficients that are generated by weight generation circuits corresponding to the digital demodulation signals based on carrier-to-noise (C/N) ratio detection signals. The weighted demodulation signals are added together by a digital addition circuit.

As explained at column 5, lines 6-28, the C/N ratio detection circuits 25a to 25d detect carrier-to-noise power ratio in the radio signals received by the antennas 10a to 10d. The detected ratios are converted into digital signals by A/D (analog-to-digital) converters, and the digital signals are supplied to the weight coefficient generation circuits 50 as C/N ratio detection signals CNSa to CNSd. The weight coefficient generation circuit 50 generates the weight coefficients WKa to WKd corresponding to digitally demodulated base band signals BSa to BSd based on the C/N ratio detection signals CNSa to CNSd. See also, column 4, lines 9 to 19, and Figure 2.

Figure 3 and column 5, lines 23-25 makes this more explicit by illustrating this disclosure with a block diagram showing the weight coefficient generation circuit, in which the weight coefficients WKa to WKd are generated based on the signals CNSa to CNSd.

Oshima asserts that even when a delay in processing occurs in the detecting circuits, it can be absorbed to always weight each symbol of the demodulated baseband signals in exact timing. Thus combining diversity reception can allegedly be performed with higher precision, as explained at column 5, lines 11-34 of Oshima.

Demodulated based baseband signals are weighted by Oshima in multiplication circuits. Thus Oshima asserts that power consumption is lowered as explained at column 6, lines 28-33.

Oshima provides a weight generation circuit with delay circuits for timing correction of weighting. Oshima's purpose is to make weight coefficients coincident

with the digitally demodulated baseband signals, as explained at column 6, lines 50-60. The weight generation circuit is also provided with standardization circuits to generate weight coefficients that are standardized such that the total sum of the weight coefficients has a preset constant value for preventing overflow in multiplication circuits, as explained at column 7, lines 8-15.

In short, Oshima is concerned with improving signal combining in a receiver. There is nothing in Oshima about "selecting weight factors of antenna elements of the antenna array ... in order to achieve a predetermined power balance between different antenna elements." Oshima merely discusses an option for timing correction of signal weighting, the purpose of which is to make weight coefficients coincident with the digitally demodulated baseband signals.

Applicant submits that the difference is not just that the claimed invention is intended for one purpose and that Oshima is intended for another purpose, rather Oshima provides different disclosure and does not describe "selecting weight factors of antenna elements of the antenna array ... in order to achieve a predetermined power balance between different antenna elements" because Oshima is directed toward a different purpose.

Accordingly, the combination of Reudink and Oshima fails to disclose or suggest at least the features of "selecting weight factors of antenna elements of the antenna array ... in order to achieve a predetermined power balance between different antenna elements." Thus, it is respectfully submitted that the combination of Reudink and

Oshima fails to disclose or suggest all of the elements of any of the presently pending claims.

The Office Action replied simply by reasserting that the features are disclosed by Oshima at column 7, lines 8-25, and by further arguing that the preset value is correlated to power. However, as Applicant has already pointed out Oshima merely discusses an option for timing correction of signal weighting, the purpose of which is to make weight coefficients coincident with the digitally demodulated baseband signals.

It is irrelevant whether the present value is correlated to power and whether, as the Office Action asserted, the weight coefficients of Oshima "are standardized such that the total sum of the weight coefficients … has a present constant value." What is claimed is, "selecting weight factors of antenna elements of the antenna array … in order to achieve a predetermined power balance between different antenna elements."

Normalizing the weighting factors such that the total is constant does not – in itself – ensure power balance between different antenna elements. Indeed, the antenna elements in Oshima can be radically imbalanced among each other by the weighting coefficients applied to each, so long as the total is normalized to a preset amount.

Accordingly, Oshima does not disclose or suggest "selecting weight factors of antenna elements of the antenna array … in order to achieve a predetermined power balance between different antenna elements" as recited by claims by each of the independent claims. It is therefore respectfully requested that this rejection be withdrawn.

Claims 4-11, 14-15, 19-26, and 29-30 depend respectively from claims 1-3 and 17-18 and recite additional limitations. Accordingly, it is respectfully submitted that each of claims 4-11, 14-15, 19-26, and 29-30 recites subject matter that is neither disclosed nor suggested in the combination of Reudink and Oshima. Therefore, it is respectfully requested that the rejection of all of claims 1-11, 14-26, and 29-33 be withdrawn.

Claims 12 and 27 were rejected under 35 U.S.C. 103(a) as being unpatentable over Reudink in view of Oshima and in further view of U.S. Patent No. 6,577,879 of Hagerman et al. ("Hagerman"). Applicant respectfully traverses this rejection.

Claims 12 and 27 depend from claims 1 and 18 respectively and recite additional limitations. The deficiencies of the combination of Reudink and Oshima with regard to claims 1 and 18 are explained in detail above. The further combination of Hagerman does not remedy this deficiency, because Hagerman does not disclose or suggest "selecting weight factors of antenna elements of the antenna array ... in order to achieve a predetermined power balance between different antenna elements" as recited by claims 1 and 18 and incorporated by reference into claims 12 and 27.

Hagerman generally relates to a system and method for simultaneous transmission of signals in multiple beams without feeder cable coherency. In general, Hagerman aims to maintain pattern control while radiating two or more beams simultaneously, and avoiding coherency requirements for feeder cables of a base station (BS) antenna arrangement, as explained at column 2, lines 48-55. Accordingly, it is unsurprising that Hagerman is silent as to "selecting weight factors of antenna elements of the antenna

array … in order to achieve a predetermined power balance between different antenna elements."

Because Hagerman does not disclose or suggest "selecting weight factors of antenna elements of the antenna array … in order to achieve a predetermined power balance between different antenna elements" it is respectfully requested that the combination of Reudink, Oshima, and Hagerman does not disclose or suggest all of the elements of claims 12 and 27, and it is respectfully requested that this rejection be withdrawn.

Claims 13 and 28 were rejected under 35 U.S.C. 103(a) as being obvious and therefore unpatentable over Reudink in view of Oshima and in further view of U.S. Patent No. 6,369,758 of Zhang et al. ("Zhang"). Applicant respectfully traverses this rejection.

Claims 13 and 28 depend from claims 1 and 18 respectively and recite additional limitations. The deficiencies of the combination of Reudink and Oshima with regard to claims 1 and 18 are explained in detail above. The further combination of Zhang does not remedy this deficiency, because Zhang does not disclose or suggest "selecting weight factors of antenna elements of the antenna array … in order to achieve a predetermined power balance between different antenna elements" as recited by claims 1 and 18 and incorporated by reference into claims 13 and 28.

Zhang generally relates to an adaptive antenna array for mobile communication. Zhang, as explained at column 2, lines 6-16, aims to provide an efficient time-domain-

based adaptive antenna array that can be used with an orthogonal frequency division multiplexed (OFDM) receiver for both coherent and non-coherent multipath reception. Zhang also aims to provide a mobile adaptive antenna array that can efficiently cancel unwanted multipath signals and surpress interfering signals at the same time. Furthermore Zhang seeks to provide an adaptive antenna array that does not require explicit knowledge of its array geometry and calibration. Accordingly, it is unsurprising that Zhang is silent as to "selecting weight factors of antenna elements of the antenna array ... in order to achieve a predetermined power balance between different antenna elements."

Because Zhang does not disclose or suggest "selecting weight factors of antenna elements of the antenna array ... in order to achieve a predetermined power balance between different antenna elements" it is respectfully requested that the combination of Reudink, Oshima, and Zhang does not disclose or suggest all of the elements of claims 13 and 28, and it is respectfully requested that this rejection be withdrawn.

Conclusion

For the reasons explained above, it is respectfully submitted that each of claims 1-33 recites subject matter that is definite and neither disclosed nor suggested in the prior art of record. Accordingly, it is respectfully requested that all of claims 1-33 be allowed and that this application be passed to issue.

If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by telephone, Applicant's undersigned attorney at the indicated telephone number to arrange for an interview to expedite the disposition of this application.

In the event this paper is not being timely filed, Applicant respectfully petitions for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account 50-2222.

Respectfully submitted,

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